



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

ground), with bran and some preparation of oil-meal. The proportions varied from time to time, but was always the same for all the animals. No molasses was used, nor condiments of any sort.

The coarse fodder was principally mixed hay (timothy and clover), relieved by roots (mangels, turnips, etc.), corn-ensilage, cut grass or corn, and in the early part by pasture. During the first summer they were on pasture a large part of the time for about four months, too long for their best good. The last summer they were out from May 17 to June 6, and rested from grain. This resulted in a temporary loss of weight, but a real advantage to the steers.

The results of this experiment seem strongly to confirm the following:—

1. The amount of food consumed is no index of the amount of gain it will produce; that is, to its profitable use and conversion into meat.

2. Neither is the total gain secured, nor the rate of gain, a sure guide to the economical use of food by the animal.

3. Large gains are not necessarily economical ones, nor medium ones necessarily costly.

4. Age is the all-controlling circumstance that decides the rate of gain. The ration necessary to sustain the gain increases with age in about the same proportion as the weight of the animal, but the gain remains absolutely about the same.

5. That "baby beef" is not inconsistent with high quality.

6. That nervousness is not necessarily a sign of a bad feeder.

7. That great development in size is not a necessary condition to profitable feeding nor to quality.

8. That the "type" of an animal has much to do with his ability to use food to good advantage in the production of meat. In this sense there is a distinction and a difference between the breeds for beef purposes.

9. Those nearest the "dairy type" made less gain to the food consumed, and it consisted more largely of fat on and about the internal organs. This type was also characterized by coarser extremities; a longer, flatter rib; more shrinkage of meat in cooling; and a higher percentage of cheap parts.

10. As between the beef breeds, Mr. Davenport thinks no one can here suggest marked differences that cannot be sufficiently explained on other grounds. As in all experiments of this kind, greater differences are noticeable within the breeds than between them. The two Herefords are in this experiment nearly at extremes in every thing but type, and in that respect as far apart as is allowable among Herefords. Aside from the Holsteins, no two animals of the lot differed more than did the two Herefords. Very close upon them came the two Galloways, with marked differences in build.

11. Knowing these animals as he did, Mr. Davenport thinks he may safely say, that as they, irrespective of breed, approached a certain stocky, blocky form, designated as the "meat type," in the same degree they proved good feeders and economical consumers of food within a reasonable age. On the other hand, as they approached the coarser or more loosely built organization, betraying a circulation more largely internal and less diffused, in about the same proportions were they less profitable consumers of food for meat purposes, and turned out a less desirable carcass for the block. If this be true, it is a question of type rather than of breed; and that breed that affords the largest proportion in members of this type is, all things considered, the best, if any one thinks he knows which breed or breeds that may be.

In saying this, Mr. Davenport believes that he only follows the teachings of this and all other experiments. Nor does it work any injustice to other types selected for and excelling in other special lines. All will make some beef. Only a few will make the best or the cheapest. The strong teaching in this is, that moderate gains are not inconsistent with profit, nor lack of age inconsistent with quality.

An experiment of this kind is attended with much expense and labor. Many a careful thought and laborious hour go to secure what passes into a few tables. If only it shall assist a little in the establishment of knowledge and of truth, and not at all in fostering an error, then every one will be well paid.

OUTLINE OF THE HISTORY OF COMMERCIAL FERTILIZERS.¹

THE history of commercial fertilizers practically dates back to the time when bones were first applied to the soil, and their value as a fertilizer was recognized. Fertilizing with bones was first practised in England. Probably the first instance of their extensive application was in the case of the farmers living near Sheffield, England, who applied to the land the bone and ivory clippings which were waste products of the knife and button factories of Sheffield. These clippings amounted to about eight hundred tons a year, and were regarded, until about a century ago, as a nuisance, the disposal of which was a serious problem to the manufacturers.

In 1774 the agricultural use of bones was first publicly recommended by Hunter, and successful experiments were made with bone-dust.

About 1814, Alexander von Humboldt called public attention to the use of guano as a fertilizer, which he had seen used by the natives of Peru.

About 1817 the first super-phosphate is believed to have been made by Sir James Murray.

It was not until after 1820 that the use of phosphates assumed any great commercial or agricultural importance, and not even then was it appreciated what gave bones their value as fertilizers.

About 1830, Peruvian guano began to be imported into Europe as a fertilizer, and, a few years after, into the United States, especially at the South.

About 1840, Liebig published the results of his researches, and suggested that plants must obtain materials for their growth from the soil as well as from the air and water, which alone were previously supposed to furnish plant-food, and hence that the proper life of a plant can be benefited by furnishing those elements that are necessary. It was shown that the phosphate of lime in bones gave them their value, and that by dissolving bones with sulphuric acid they were made much more effective. The demand for bones then outran the supply. Other sources were looked for, and in 1843 a new source of phosphate of lime was found in Spain, consisting of a rock which contained considerable amounts of phosphoric acid. On trial, this rock was found to be a substitute for bone.

In the United States, farmers first used bones about 1790. The first bone-mill was built about 1830, and super-phosphates were first used in 1851. The discovery of the so-called South Carolina rock was a great boon to those using commercial fertilizers, as this was found to take the place of bones.

The investigations based upon Liebig's theory showed that other elements in addition to phosphorus must be used to secure the best results, and gradually commercial fertilizers containing other elements came to be manufactured and offered for sale.

LETTERS TO THE EDITOR.

Ohio State University.

BY the recent passage of the Hysell Bill in the Ohio Legislature, which levies a tax of one-twentieth of a mill on every dollar of taxable property in the State, some attention has been turned toward this institution.

The institution was founded in 1862. At that time the State received from the United States 630,000 acres of land; and now the fund from the sale of this land is nearly \$540,000, and yields an income of over \$32,000.

The legislature has made liberal appropriations from time to time, but the trustees and faculty have hesitated to lay out very extensive plans, for this support was not entirely sure; but, now that this can be depended upon, plans for increasing the facilities of the institution will be carefully considered. The tax will bring the university \$90,000 each year, which, together with what it receives from other sources, places Ohio on her feet in the educational race; and she will soon be in advance of her weaker sisters,

¹ From Bulletin No. 26 of the New York Agricultural Experiment Station.

and, instead of holding twenty-fourth rank in education, she will soon take a place in the front, if not in the lead.

The institution has experienced steady growth ever since it was founded. The number of students has increased, and new buildings have been erected for their accommodation. The last one was built in the fall of 1890, and is devoted exclusively to veterinary medicine and science. The new chemical laboratory, dedicated last month, is constructed according to the latest improved plan, and students have the best opportunities for study in all branches of chemistry. In the botanical laboratory is found specimens of plant-life from many parts of the world, and several herbariums both of our own flora and many plants from other countries.

In the mechanical laboratory is found tools and power for the various branches of mechanical art. The physical and electrical laboratories are supplied with the necessary appliances and apparatus for those studies.

The departments of physiology, geology, and zoölogy are in the main building, and are as well equipped as the former circumstances would allow. Students are encouraged, in the natural sciences especially, to original and independent investigation; and to facilitate this, excursions are made to places of especial geological, botanical, or entomological interest. In connection with the university is a biological club, consisting largely of professors and students who are doing advanced work in biology.

Among the many needs of the institution may be mentioned a hall for military drill, a fire-proof building in which to place the valuable geological and botanical museums and the library, more class-rooms, and better equipment in all departments. Other departments will be added to the institution, whose needs, with those of the present departments, will be well supplied; for the aggregate support is now adequate to a great institution, which Ohio State University is destined to be.

E. E. BOGUE.

Columbus, O., April 3.

BOOK-REVIEWS.

Mixed Metals, or Metallic Alloys. By ARTHUR H. HIORNS. London and New York, Macmillan. 12°. \$1.50.

IN this serviceable and timely volume Mr. Hiorns not only brings his subject up to date, but deals with it in a manner well adapted to the requirements of students and practical men. In these particulars he has followed the same methods used by him in his previous works in the same line, — "Elementary Metallurgy," "Practical Metallurgy," and "Iron and Steel Manufacture." We wish, though, he had omitted the first clause of his title. "Mixed metals," no matter how common the term may be in the metal trade, cannot fairly be considered as equivalent to "metallic alloys;" in other words, a true alloy is not a mere mixture of metals. Aside from this, there is no fault to find with the book.

Publications received at Editor's Office,
March 30-April 4.

- CAMMANN, D. M. The Physical Diagnosis of the Diseases of the Heart and Lungs and Thoracic Aneurism. New York, Putnam. 188 p. 16°. \$1.25.
- DAVIES, T. A. Am I Jew or Gentile? Read and see. New York, E. H. Coffin. 87 p. 16°.
- FLUGEL, F. A Universal English-German and German-English Dictionary. Vol. I. Part I. Braunschweig and New York, Westermann. 192 p. 4°. \$1.00.
- KNOFLACH, A. A Sound-English Primer. New York, Stechert. 68 p. 12°.
- LANKESTER, E. R. Zoological Articles contributed to the "Encyclopædia Britannica," etc. Edinburgh, Black; New York, Scribner. 195 p. 4°. \$5.00.
- MAXWELL, W. H. Advanced Lessons in English Grammar. New York, Cincinnati, and Chicago, Amer. Book Co. 327 p. 12°. 60 cents.
- NEWSDEALER'S and Publisher's Bulletin. Vol. I., No. 1. March 2, 1891. New York, Newsdealer's and Publisher's Bull. Pub. Co. 24 p. 4°. \$1 per year.
- QUACKENBOS, J. D., and others. Appletons' School Physics. New York, Cincinnati, and Chicago, Amer. Book Co. 544 p. 12°. \$1.30.
- SMITHSONIAN INSTITUTION. Annual Report of the Board of Regents of the, showing the Operations, Expenditures, and Condition of the Institution to July, 1889. Washington, Government. 815 p. 8°.
- U. S. DEPARTMENT OF AGRICULTURE. Proceedings of the Seventh Annual Convention of the Association of Official Agricultural Chemists held at the U. S. National Museum, Aug. 28, 29, and 30, 1890. Washington, Government. 238 p. 8°.

A SYSTEM OF EASY LETTERING.

By J. H. CROMWELL, Ph.B.

Twenty-six different forms of Alphabets. The space to be lettered is divided into squares, and with these as a guide the different letters are drawn and inked. Price, 50 cents, postpaid.

E. & F. N. SPON, 12 Cortlandt Street, New York.

SCIENCE CLUBBING RATES.

10% DISCOUNT.

We will allow the above discount to any subscriber to *Science* who will send us an order for periodicals exceeding \$10, counting each at its full price.

N. D. C. HODGES, 47 Lafayette Place, N. Y.

Old and Rare Books.

BACK NUMBERS and complete sets of leading Magazines. Rates low. AM. MAG. EXCHANGE. Schoharie N Y

"The Week, one of the ablest papers on the continent."—*Descriptive America.*

THE WEEK,

A Canadian Journal of Politics, Literature, Science and Art.

PUBLISHED EVERY FRIDAY.

\$3.00 per Year. \$1.00 for Four Months.

THE WEEK has entered on its EIGHTH year of publication, greatly improved in every respect, rendering it more worthy the cordial support of every one interested in the maintenance of a first-class literary journal.

The independence in politics and criticism which has characterized THE WEEK ever since its first issue will be rigidly maintained; and unceasing efforts will be made to improve its literary character and increase its attractiveness as a journal for the cultured home. Many new and able writers are now, or have promised to become, contributors to its columns, and the constant aim of the Publisher will be to make THE WEEK fully equal to the best literary journals in Britain and the United States.

As heretofore, PROF. GOLDWIN SMITH will, from time to time, contribute articles. London, Paris, Washington and Montreal letters from accomplished correspondents will appear at regular intervals. Special Ottawa Letters will appear during the sessions of Parliament.

THE WEEK being the same size as "Harper's Weekly," is the largest paper of its class on the continent.

SEND FOR FREE SAMPLE COPY.

C. BLACKETT ROBINSON, Publisher,
5 Jordan St., Toronto, Canada.

THE AMERICAN GEOLOGIST FOR 1891 AND BIEN'S NEW ATLAS OF THE METROPOLITAN DISTRICT,

will be given to **New Subscribers** to the GEOLOGIST for \$25.00 (which is the regular price of the Atlas alone), if ordered through the GEOLOGIST.

For other premiums see the GEOLOGIST for Nov., Dec., and Jan. Address

THE GEOLOGICAL PUBLISHING COMPANY,
Minneapolis, Minn.

THE BOTANICAL GAZETTE.

A monthly illustrated journal of botany in all its departments.

25 cents a number, \$2.50 a year.

Address PUBLISHERS BOTANICAL GAZETTE,
Crawfordsville, Ind.

Publications of the University of Pennsylvania.

SERIES IN

Philology, Literature and Archæology.

Vol. I. now ready.

- Poetic and Verse Criticism of the Reign of Elizabeth. By Felix E. Schelling, A.M., Assistant Professor of English Literature. \$1.00.
- A Fragment of the Babylonian "Dibbarra" Epic. By Morris Jastrow, Jr., Ph.D., Professor of Arabic. 60 cents.
- a. *Ἰπὸς* with the Accusative. b. Note on a Passage in the Antigone. By William A. Lamberton, A.M., Professor of the Greek Language and Literature. 50 cents.
- The Gambling Games of the Chinese in America. Fán tán and Pák kòp piá. By Stewart Culin, Secretary of the Museum of Archæology and Palæontology. 40 cents.

In preparation.

The Terrace at Persepolis. By Morton W. Easton, Ph.D., Professor of Comparative Philology.
An Aztec Manuscript. By Daniel G. Brinton, M.D., Professor of American Archæology and Linguistics.

A Monograph on the Tempest. By Horace Howard Furness, Ph.D., LL.D.

Recent Archæological Explorations in New Jersey. By Charles C. Abbott, M.D., Curator of the American Collections.

Archæological Notes in Northern Morocco. By Talcott Williams, A.M., Secretary of the Museum of Egyptian Antiquities.

a. On the Aristotelian Dative. b. On a Passage in Aristotle's Rhetoric. By William A. Lamberton, A.M., Professor of the Greek Language and Literature.

A Hebrew Bowl Inscription. By Morris Jastrow, Jr., Ph.D., Professor of Arabic.

The Life and Writings of George Gascoigne. By Felix E. Schelling, A.M., Assistant Professor of English Literature.

The Papers of this Series, prepared by Professors and others connected with the University of Pennsylvania, will take the form of Monographs on the subjects of Philology, Literature, and Archæology, whereof about 200 or 250 pages will form a volume.

The price to subscribers to the Series will be \$1.50 per volume; to others than subscribers, \$2.00 per volume.

Each Monograph, however, is complete in itself, and will be sold separately.

It is the intention of the University to issue these Monographs from time to time as they shall be prepared.

Each author assumes the responsibility of his own contribution.

N. D. C. HODGES,

47 Lafayette Place, New York, N. Y.

BOOKS: How to get them. If there is any book or pamphlet that you want, write to the Science Book Agency, 47 Lafayette Place, New York.